

§ 102(e) Rejections

The Office Action states: “Claims 1 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Rosman et al. (6,222,550).” (Office Action, ¶ 4, pg. 3). A claim is anticipated only if each and every element as set forth in the claim is found, either expressly, or inherently described, in a single reference.¹ Furthermore, the identical invention must be shown in as complete detail as contained in the claim.²

Applicants submit that Rosman et al. fails to disclose each and every element of Applicants’ claimed subject matter and respectfully request the Examiner to withdraw the rejections. In addition, Applicants submit that Rosman et al does not, disclose, teach or suggest, either implicitly or explicitly, whether considered alone or in combination with the other cited art, Applicants’ claimed subject matter.

Rosman et al.

Rosman et al. is directed to the use of multiple triangle pixel-pipelines having a span-range pixel interlock for processing separate non-overlapping triangles for a superscalar 3D graphics engine. Here, Rosman et al. discloses a system using parallel pixel-pipelines that each input the slopes and vertices of a given triangle and subsequently generate corresponding pixels values by first determining endpoints for each horizontal span and incrementing x values, left to right, up to, but not past, the location of the corresponding endpoint.

Independent Claim 1

The Office Action equates Applicants’ “look-ahead module that identifies pixels that are inside the primitive,” (Claim 1), with that described in Rosman et al.’s “Fig 3, Abstract line 2-6,

¹ *Glaverzel Societe Anonyme v. Northlake Marketing & Supply, Inc.*, 75 F.3d 1550, 1554 (Fed. Cir. 1999); *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1953 (Fed. Cir. 1987).

² *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989).

[and] col 3 line 63-67,” (Office Action, pg. 3). Applicants, in reviewing Fig 3, Abstract line 2-6, [and] col 3 line 63-67 of Rosman et al., can not identify how Rosman et al. determines if a pixel is inside or outside a primitive. However, Applicants refer the Examiner to Rosman et al.’s language that states “each triangle pixel-pipeline generates span endpoints and rasterizes pixels within a triangle.” Here, Applicants submit that, Rosman et al. teaches away from a “look-ahead module that identifies pixels that are inside the primitive,” as Rosman et al. requires the pre-calculating of a span end point for each horizontal span before such a horizontal span is rendered. In Rosman et al.’s system, there is no need to look ahead as the ending point is known before the process starts. As such, Rosman et al. simply loops through a known length of x values, stopping at the last x value in the span, (see the code listed in col. 13, lns. 6-34). In Rosman et al. there is no need, for example, to check the next sequential x value when it is known that the current x value is last x value in the span. Therefore, Applicants submit, that at least for the above reasons, that Rosman et al. does not disclose, teach or suggest Applicants’ claimed subject matter.

Independent Claim 9

In response to the Office Action’s rejections of claim 9, Applicants direct the Examiner’s attention to Applicants’ arguments above directed to claim 1 regarding similar claim language. In particular, Applicants direct the Examiner’s attention on Applicants’ claim language which states, inter alia, “looking ahead to a next adjacent pixel to determine if the next adjacent pixel is inside of the triangle,” (claim 9), and submit that, as discussed above, Rosman et al. describes and requires a calculation to determine the endpoint for each horizontal span of the triangle, and because such endpoints are then used by the raster engine to know when a current x value is a last x value for a given span (e.g., without looking ahead to a next sequential x value), that Rosman et al. teaches away from Applicants’ claimed subject matter.

§ 103(a) Rejections

The Office Action states that claims 2 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosman et al in view of Zhao et al. (Office Action, pg. 4).

Dependent Claim 2

Applicants acknowledge the Examiner's statement that Rosman et al fails to teach that the scan module is structured to perform block mode scanning.

Zhao et al.

Zhao et al. is directed to a block- and band-oriented traversal in three-dimensional triangle rendering. Zhao et al. discusses the determining of whether the end of a current span has been reached. (col. 8, lns. 47-53). The end is determined by determining the position of the currently selected pixel in comparison to the demarcation edge of the primitive. (Id.) Here, Zhao et al. is limited to describing the checking of a current pixel and does not discuss the looking ahead to a next pixel. In addition, specifically relating to Zhao et al.'s discussion of block- and band-oriented traversals, and as shown in detail in Fig. 13, even though Zhao et al. discusses the rendering of groups of pixels, or blocks of pixels, (i.e., the block defined by the horizontal 15-16 and 7-8, and the vertical 0 and 7-8 boundaries), a similar left to right individual pixel traversal is still contemplated, (col. 10, lns. 43-51), and for at least pixels 3 and 7, (Fig. 13), such pixels are determined as being an end pixel in the same technique described above using a current pixel determination scheme. In other words, even though the processing of pixels in blocks is described, the same processing arises, at least, for those occasions where the edge of a triangle ends before the end or edge of a corresponding block. Therefore, whether a block traversal or a span-walking scheme is used, Zhao determines the end of span by determining the position of a currently selected pixel, not a next-look-ahead pixel. As such, Applicants submit that Zhao et al.

teaches away from Applicants claimed subject matter as it discloses a current pixel determination scheme, rather than a next pixel look ahead process. Therefore, Applicants submit that neither Rosman et al. or Zhao et al., either implicitly or explicitly, or when considered alone or in combination, disclose, teach or suggest Applicants' claimed subject matter.

Applicants note that court decisions have held that in order for prior art references to be combined by obviousness, at a minimum, there must be a suggestion of desirability for the modification. In re Fritch, 922 F.2d 1260, 23 USPQ 2d 1780 (Fed. Cir. 1992). The CAFC has held that the motivating suggestion must be explicit. Winner International Royalty Corp. v. Wang, 48 USPQ 2d 1139 (D.C. Dist. Ct. 1998), aff'd, 98-1553 slip op. (Fed. Cir. 2000). Rosman et al. and Zhao et al. do not suggest a desirability for modification, explicit or otherwise. Additionally, since none of the cited references teach or suggest a look-ahead module that identifies pixels that are inside of the primitive, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

In addition, Applicants also submit that because claim 2 depends from claim 1, and as a dependent claim therefrom, claim 2 is allowable for at least the reasons claim 1 is allowable. Applicants further submit that claim 2 is also allowable in light of the presence of novel and non-obvious elements contained in claim 2 that are not otherwise present in claim 1.

Dependent Claim 10

Applicants direct the Examiner's attention to the arguments above regarding claims 2 and 9. Applicants respectfully submit, that in light of such arguments, that neither Rosman et al. nor Zhao et al., either implicitly or explicitly, or when considered alone or in combination, disclose, teach or suggest Applicants' claimed subject matter. More specifically regarding claim 9, Applicants submit that, at least, because claim 10 depends from claim 9, and as a dependent claim therefrom, claim 10 is allowable for at least the reasons claim 9 is allowable. Applicants

further submit that claim 10 is also allowable in light of the presence of novel and non-obvious elements contained in claim 10 that are not otherwise present in claim 9.

The Office Action states that claims 3-5 and 11-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosman et al in view of Malamy et al. (Office Action, pg. 5).

Dependent Claim 3

Applicants acknowledge the Examiner's statement that Rosman et al. does not explicitly disclose that the representative values are edge function of the triangle or edge function of a longest side of a triangle.

Malamy et al.

Malamy et al. is directed to polygon rendering with a dedicated setup engine. More specifically, Malamy et al. discloses a system of rendering polygons using two division operations rather than four. (col. 2, lns. 34-44).

Applicants submit that none of the cited language from Malamy et al., (Abstract, Fig. 2, Fig. 3, Fig. 4, col 2, lns. 45-54, col 5 lns. 1-5), contain any reference to Applicants' edge function. In contrast, Malamy et al. discloses an edge walker that iterates along the long edge of a triangle determining starting points for successive spans, (col. 3, lns. 45-54). As such, Malamy et al. is not identified as disclosing "edge functions," (claim 3), including, for example, " $E0=(X2-X1)(Y-Y0)-(Y2-Y0)(X-X0)$," " $E1=(Y1-Y0)(X-X0)-(X1-X0)(Y-Y0)$ " and " $E2=(Y2-Y1)(X-X1)-(X2-X1)(Y-Y1)$," (Fig. 3).

Further, Applicants respectfully submit that neither Rosman et al. and Malamy et al. suggest a desirability for modification, explicit or otherwise. Additionally, since none of the cited references disclose, teach or suggest representative values [that] are at least one edge function of [a] triangle, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

In addition, Applicants also submit that, at least, because claim 3 depends from claim 1, and as a dependent claim therefrom, claim 3 is allowable for at least the reasons claim 1 is allowable. Applicants further submit that claim 3 is also allowable in light of the presence of novel and non-obvious elements contained in claim 3 that are not otherwise present in claim 1.

Dependent Claim 4

Applicants direct the Examiner's attention to the arguments above regarding claims 3 and 1. Applicants respectfully submit that, at least in light of such arguments, that neither Rosman et al. nor Malamy et al., either implicitly or explicitly, or when considered alone or in combination, disclose, teach or suggest Applicants' claimed subject matter. More specifically regarding claim 1, Applicants submit that, at least, because claim 4 depends from claim 1, and as a dependent claim therefrom, claim 4 is allowable for at least the reasons claim 1 is allowable. Applicants further submit that claim 4 is also allowable in light of the presence of novel and non-obvious elements contained in claim 4 that are not otherwise present in claim 1.

Dependent Claim 5

Applicants direct the Examiner's attention to the arguments above regarding claim 1. In addition, Applicants further submit that simultaneous processing of two adjacent horizontal lines of pixels by two pixel pipelines does not disclose, teach or suggest Applicants' claimed subject matter including, inter alia, a "scan module ... structured to check a next adjacent pixel while processing a current pixel to determine if the next adjacent pixel is inside the triangle," (claim 5), for at least the reason that that processing two adjacent pixels is not the same as checking a next adjacent pixel while processing a current pixel. What Rosman et al. discloses is two dual pipelines processing two current pixels at once. Further, the language identified by the Office Action referring to span-range checking, e.g., col. 7, lns. 12-16, is directed to the checking of a

range of pixels as being processed in parallel by two separate pixel pipelines, not Applicants' claimed subject matter.

In addition, Applicants also submit that, at least, because claim 5 depends from claim 4, and as a dependent claim therefrom, claim 5 is allowable for at least the reasons claim 4 is allowable. Applicants further submit that claim 5 is also allowable in light of the presence of novel and non-obvious elements contained in claim 5 that are not otherwise present in claim 4.

Dependent Claim 11

Applicants direct the Examiner's attention to the arguments above regarding claims 3 and 9. Applicants respectfully submit, that at least in light of such arguments, that neither Rosman et al. or Malamy et al., either implicitly or explicitly, or when considered alone or in combination, disclose, teach or suggest Applicants' claimed subject matter. More specifically regarding claim 9, Applicants submit that, at least, because claim 11 depends from claim 9, and as a dependent claim therefrom, claim 11 is allowable for at least the reasons claim 9 is allowable. Applicants further submit that claim 11 is also allowable in light of the presence of novel and non-obvious elements contained in claim 11 that are not otherwise present in claim 9.

Dependent Claim 12

Applicants direct the Examiner's attention to the arguments above regarding claims 4 and 9. Applicants respectfully submit, that at least in light of such arguments, that neither Rosman et al. nor Malamy et al., either implicitly or explicitly, or when considered alone or in combination, disclose, teach or suggest Applicants' claimed subject matter. Further, regarding claim 9, Applicants submit that, at least, because claim 12 depends from claim 9, and as a dependent claim therefrom, claim 12 is allowable for at least the reasons claim 9 is allowable. Applicants further submit that claim 12 is also allowable in light of the presence of novel and non-obvious elements contained in claim 12 that are not otherwise present in claim 9.

Independent Claim 13

Applicants direct the Examiner's attention to the arguments above regarding claims 2 and 3. Specifically, Applicants respectfully submit that neither Rosman et al., Zhao et al., nor Malamy et al., explicitly or implicitly, whether considered alone or in any combination thereof, disclose teach or suggest, inter alia, "a first module that generates *edge functions*, for the primitive and that provides indication of which of the edge functions corresponds to a longest side of the triangular primitive, and that provides starting coordinates for the triangle primitive" (claim 13). Applicants direct the Examiner to the arguments above regarding claim 3 addressing the lack of any disclosure, teaching or suggestion of Applicants' edge functions.

Next, Applicants also respectfully submit that neither Rosman et al., Zhao et al., nor Malamy et al., explicitly or implicitly, whether considered alone or in any combination thereof, disclose teach or suggest, inter alia, "a third module that, from a current pixel, determines if a *next pixel* is within the triangular primitive, the third module only storing a data value of the next pixel when the next pixel is inside of the triangular primitive," (claim 13). Here, Applicants direct the Examiner to the above arguments regarding claim 2 addressing the lack of any disclosure, teaching or suggestion of any checking a next pixel while processing a current pixel.

Dependent Claim 14

Applicants direct the Examiner's attention to the arguments above regarding claims 2 and 13. Specifically, as discussed above regarding claim 13, and the lack of any disclosure, teaching or suggestion of Applicants' "third module that, from a current pixel, determines if a *next pixel* is within the triangular primitive, the third module only storing a data value of the next pixel when the next pixel is inside of the triangular primitive, (claim 13). Applicants further submit that Applicants' claim language including, inter alia, "a current pixel ... and a data value is saved for a next pixel within the triangular primitive only when the next primitive is within the triangular

primitive, (claim 14), is also not disclosed, taught or suggested, by any of the cited references, whether considered alone or in any combination, for at least reasons similar to those discussed above regarding claim 2.

In addition, Applicants also submit that, at least, because claim 14 depends from claim 13, and as a dependent claim therefrom, claim 14 is allowable for at least the reasons claim 13 is allowable. Applicants further submit that claim 14 is also allowable in light of the presence of novel and non-obvious elements contained in claim 14 that are not otherwise present in claim 13.

Dependent Claim 15

Applicants direct the Examiner's attention to the arguments above regarding claim 13. Applicants submit that, at least, because claim 15 depends from claim 13, and as a dependent claim therefrom, claim 15 is allowable for at least the reasons claim 13 is allowable. Applicants further submit that claim 15 is also allowable in light of the presence of novel and non-obvious elements contained in claim 15 that are not otherwise present in claim 13.


Dependent Claim 16

Applicants direct the Examiner's attention to the arguments above regarding claim 13. Applicants submit that, at least, because claim 16 depends from claim 13, and as a dependent claim therefrom, claim 16 is allowable for at least the reasons claim 13 is allowable. Applicants further submit that claim 16 is also allowable in light of the presence of novel and non-obvious elements contained in claim 16 that are not otherwise present in claim 13.

CONCLUSION

For the foregoing reasons, withdrawal of the rejections and allowance of the claims is respectfully requested. If there are any questions or comments regarding this response, the Examiner is encouraged to contact the undersigned at 312-609-7500.

Respectfully submitted,

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